

Do Mexican Americans Perceive Environmental Issues Differently than Caucasians: A Study of Cross-Ethnic Variation in Perceptions Related to Water in Tucson

Bryan L. Williams and Yvette Florez

College of Public Health, University of Arizona, Tucson, Arizona, USA

Little is known about the environmental perceptions of our nation's Mexican and Mexican American population, especially in the area of water quality. We examined these perceptions to determine the extent to which Caucasians and Mexican Americans living in the Tucson, Arizona, metropolitan area differ in their perceptions of water quality-related risk, inequity, trust, and participation in civic activities. Ethnic variations in perceptions toward inequity, trust, and public participation were observed even when socioeconomic variation between Caucasians and Mexican Americans was controlled. However, significant ethnic variations in perceptions of water quality-related risks were observed only when socioeconomic variation was not controlled. Implications of these findings to environmental justice efforts in Mexican American communities are discussed. **Key words:** environmental equity, environmental justice, Hispanic, Mexican American, public participation, risk perception, water. *Environ Health Perspect* 110(suppl 2):303–310 (2002).

<http://ehpnet1.niehs.nih.gov/docs/2002/suppl-2/303-310williams/abstract.html>

Background

Environmental and economic inequity are quite prolific throughout many minority communities in the United States (1–5). Substandard housing, occupational hazards, poor water quality, and inequitable distribution of hazardous waste sites represent only a few of the problems that compromise the health of minority populations, especially minority children (3,6,7). Such problems are becoming increasingly prevalent among our nation's ever-growing Mexican/Mexican American population (4,5), yet concerns of Mexican Americans relating to environmental problems are rarely delineated and frequently stereotyped. Consequently, in this population, the environmental needs (i.e., improved water quality) consistently go unmet.

Current Problems Facing the Mexican American Population

Increasing evidence indicates that disparate environmental and economic conditions have taken their toll on the health of the U.S. Hispanic population (e.g., Mexican Americans) (8–12). These studies have yielded some very basic facts concerning Hispanics living in the United States. However, it is important to note these studies frequently do not differentiate between or do not include various Hispanic subgroups, so any inferences made from these studies concerning Mexican Americans, although useful, should be made cautiously. Nonetheless, Hispanics and Mexican Americans obviously share many of the same problems.

Hispanics living in the United States face a multitude of environmental economic problems. First, Hispanics are among the most impoverished and poorly educated population

in our nation. Poverty rates among Hispanics are more than 3 times those of Caucasians in the United States (8), and educational attainment is much lower among Hispanics than among Caucasians (8). Second, Hispanics suffer disproportionate rates of environmentally related morbidity and mortality when compared with more affluent and better-educated populations (9–12). Third, Hispanics often live in environmentally stressed communities in which environmental hazards in the community are prevalent. The unusually high prevalence of environmental hazards in minority communities has been well documented, particularly in Hispanic communities (4,5,12–14). Studies have shown that Hispanics are more likely to live near a Superfund site than are Caucasians (15). Hispanics are also more likely than other ethnic groups to live in areas where drinking water is highly contaminated (9,16–18). Additionally, hazardous waste sites are more frequently found in regions with the highest percentage of Hispanic residents (19). Finally, ethnicity alone is an insufficient predictor of health perceptions, behaviors, and outcomes among Hispanics. Several studies have shown that culture directly and indirectly impacts the health (e.g., morbidity rates) of Hispanics, perhaps more so than any other minority group (20–27).

Current Problems Facing the Mexican American Population in Tucson, Arizona

Like their Hispanic counterparts throughout the nation, Mexican Americans living in Tucson, Arizona, are confronted with several harsh economic and environmental realities. First, Mexican Americans in Tucson are

substantially more impoverished and less educated than Caucasians living in the city (28). Second, evidence indicates that Mexican Americans in Tucson and throughout Arizona are disproportionately exposed to various environmental contaminants (29–31). Not surprisingly, these Mexican American neighborhoods are also in closer proximity to hazardous waste sites than are Caucasian neighborhoods. In Tucson, it is estimated that Mexican American neighborhoods are about 4.5 times more likely than Caucasian neighborhoods to be within 2 km of a state or federally designated hazardous waste site or a toxic release inventory facility (32). Third, unusually high and disproportionate rates of morbidity related to environmental exposures have been found among Tucson Mexican Americans (30,33–38).

Finally, it is reasonable to suggest that Tucson's social and political environments hamper environmental justice efforts in the community. Some researchers have suggested that environmental racism is pervasive throughout Tucson (39). The environmental plight of the Mexican American population in Tucson has garnered national attention (40). Clarke and Gerlak suggest that environmental inequity continues to be a constant reality for Tucson's "forgotten southsiders" (39). The researchers also suggest that official responses to the problems of Tucson's forgotten southsiders have been less than adequate. State legislatures have even labeled a vital healthcare facility for the southside residents as governmental "pork" (39).

Water quality problems in Mexican American communities in Tucson. Water contamination is acutely problematic for Tucson's Mexican American population. Trichloroethylene, volatile organic compounds, and chromium represent only a few of the contaminants in water that have threatened the health of this population

This article is part of the monograph *Advancing Environmental Justice through Community-Based Participatory Research*.

Address correspondence to B.L. Williams, University of Arizona, College of Public Health, PO Box 245163, Tucson, AZ 85724 USA. Telephone: (520) 626-3362. Fax: (520) 626-8369. E-mail: bryanw@u.arizona.edu

This study was funded by the University of Arizona, College of Public Health.

Received 13 August 2001; accepted 12 December 2001.

(41). Environmental contamination of drinking water (e.g., bacteriologic, nitrate, and volatile organic compounds) continues to be a problem in Mexican American communities throughout the Sonoran Desert region, mostly in the U.S.–Mexico border region of the desert (42,43). Further complicating matters is the region's rapidly depleting groundwater resources. Once dependent only on groundwater, Tucson's increasing demand for and decreasing supply of the region's groundwater stores has inevitably led to the introduction of alternative sources (44–46). Since 2001, Central Arizona Project (CAP) surface water has been blended with groundwater to help meet the increasing need for water in Tucson. Despite Tucson's long history of water quality problems, little or no effort has been made to involve the public in water quality policy, especially the Mexican American public. Obviously, understanding the public's perceptions about environmental risk, inequity, and trust in institutions is key to achieving environmental equity.

Public Perceptions of Institutional Trust and Environmental Risk

The literature suggests that the public's trust in environmentally related institutions is mostly a function of personal, economic, geographic, and social factors (3,47–49). Additionally, those living in poor, underserved, and environmentally stigmatized communities frequently possess an inherent distrust of the institutions seemingly responsible for the environmental condition of such communities (3). Distrust is commonly associated with a number of these factors including but not limited to low socioeconomic status, living in close proximity to environmental stressors, having an extrinsic locus of control, and a willingness to accept risks for economic gain (50,51). Despite the wealth of literature in this area, we know very little about the views of Mexican Americans. Consequently, Mexican Americans are often alienated from the environmental policy decision-making process.

Public Participation

Increasing evidence indicates that involving the public in environmental and technical decisions can decrease public opposition and thus facilitate positive changes (52–54). However, some argue that the public is not interested in participating and that involving activists and special-interest groups damages the process (54–56). Others insist that the public is a rightful participant in decision making, especially given the tendency of science to narrowly frame issues such as environmental risk (54,57). Irrespective of one's position on public

involvement, there is some agreement on who in the citizenry is more likely to become involved. Frequently, well-educated citizens who perceive some immediate economic or health threat are the most predisposed toward involvement in environmental policy decisions (58–60). Ethnic minority groups often do not participate at a high level in various types of public policymaking (3,61). Consequently, minority groups typically have little impact on policies that may result in environmental inequities in their communities. Unfortunately, there is a dearth of literature concerning Mexican American participation in environmental policymaking. Such studies are needed to foster environmental equity in these communities.

Purpose

As evidenced by the aforementioned studies, we know that Mexican Americans in Tucson are environmentally and economically stressed. What we do not know is how economic and environmental stresses have affected their perceptions toward water contamination, their trust in various public institutions, and their civic participation. Furthermore, we do not know the extent to which the perceptions and participatory actions of Mexican Americans differ from those of Caucasians who live in the same city but under superior economic and environmental conditions. Finally, if differences do exist between the two ethnic groups, to what extent are such differences simply a function of economic and educational disparity rather than ethnicity? In this study we compare the perceptions and participatory actions of Mexican Americans and Caucasians in a very specific environmental context: water quality and environmental inequity. The primary research question addressed by this study is as follows: To what extent do ethnicity, income, education, and length of residence influence public perception and participation?

Methodology

Using random digit dialing, researchers conducted a cross-sectional telephone population survey of 1,183 Tucson residents. The survey was completed within 5 weeks. Data analysis and preparation of statistical summaries were completed within 6 weeks.

Study Region Characteristics

Tucson comprises an estimated 481,100 residents (62). In terms of ethnicity, Mexican Americans account for 28.7% of the total population, Caucasians 63.7%, African Americans 3.8%, and Native Americans 3.5% (62). Overall, ethnic minority groups account for 36.3% of the total population (62). More than 80,000 Tucson residents live within the 16-square-mile area of the

Tucson International Airport Area (TIAA) Superfund site. Approximately 90% of these residents are Mexican American. TIAA is positioned in the northern section of the Tucson Basin in Pima County.

Sample Size

Sample size was determined through power analysis. The range of variables to be investigated, the desired level of precision, confidence levels, the degree of sample variability, and the estimated proportion of households in each county in the region with access to a phone were all factored into the analysis. Because a survey of precisely this nature had not been done previously, the variability of the variables being studied within the target population is unknown; thus, maximum variability ($p = 0.5$) was assumed. A simplified power analysis formula for proportions was used for calculating sample size. In terms of sampling, Tucson residents living within city boundaries were sampled within ± 3 –5% margin of sampling error. The power analysis indicated that approximately 1,000 respondents were needed to meet the above margins of sampling error.

Instrumentation. Respondents were surveyed using the Water Perception and Use Inventory (WPUI). Designed specifically for telephone interviewing, the WPUI is a closed and open-ended item questionnaire. The WPUI contains five intact Likert-scaled items. A total of 80 items were developed and systematically field-tested for use in the WPUI. The WPUI was written in Spanish and in English. Standard translation protocols were used for constructing the Spanish version of the instrument.

Item functioning was assessed using classic item analysis. The entire item pool was field-tested before final inclusion in the WPUI. Field-test data were used to evaluate items with respect to discrimination, difficulty, and reliability of intact scales. A point-biserial correlation was used to evaluate an item's ability to differentiate among respondents answering in opposing directions. Only items with discrimination values above 0.30 were retained in the final version of the WPUI. Optimal difficulty levels (p -value) are a function of the item format. Dichotomous and 5-point Likert scale items were the primary item formats used in the WPUI. The optimal p -value for a dichotomous item is 0.75 and 0.60 for a five-option item. Only items with p -values within ± 0.10 optimal values were retained in the final version of the WPUI. Cronbach α was used to estimate the internal consistency of intact scales. During field-testing, a Cronbach α of 0.80 was established as the minimal acceptable reliability for any given scale. Items that decreased the scale reliability below the 0.80

level were typically omitted. Data obtained from the actual study indicated that the mean Cronbach α for the four WPUi intact scales used in this analysis was 0.82.

Data collection. Data were obtained using a computer-aided telephone interviewing (CATI) system. Telephone-based surveys generally evoke higher response rates than mail, computer, and household surveys, particularly in large population studies. Interviewers used standard telephone directories to identify phone prefixes. Using the identified prefixes, computers generated random phone numbers for the sample. Calls were made between the hours of 10:00 A.M. and 8:00 P.M. (Mountain Time) Monday through Friday, and 11:00 A.M. to 3:00 P.M. on Saturday and Sunday. If the computer system did not make initial contact with a given number, the number was called at least more 5 times before it was eliminated from the sample.

Once contact was made, the interviewer undertook the following procedures. First, the interviewer stated the purpose of the call and had the respondent confirm his or her telephone number, ZIP code, and place of residence. Second, the interviewer solicited the participation of the adult person in the household having the next birthday. Once the respondent met the delimiting criteria, he or she was read an informed consent and subsequently asked if he or she would volunteer to participate. The informed consent described how the respondent could terminate his or her participation at any point in the interview, decline to answer any question without risk of reprisal, or reschedule the interview at a more convenient time. Investigators were required by our Institutional Review Board to obtain verbal informed consent from each participant. If consent were given for the interview, the subject was automatically assigned a respondent identification code by the CATI system to identify his or her responses. The identification code was separated from any potential identifiers of the respondent (e.g., name, address, telephone number). Each respondent's answer to specific items (e.g., open-ended items) was recorded directly into the computer to limit the potential for data transfer error.

Research variables. Criterion variables in this study included level of public participation; perceived risk and perceived efficacy of risk reduction; perceived environmental and social inequity; and institutional trust. Predictor variables included selected demographic characteristics. It is important to note that we did not differentiate between Mexican and Mexican Americans in the sample.

Treatment of data. For each respondent, a mean score was computed for perceived inequity and need, risk reduction, risk

perception, trust, and trust in the Tucson Water utility. These scores were calculated on the basis of the responses to each question, excluding "don't know," refused to answer, and missing responses. The purpose of this approach was to create a value reflective of the respondent's total scaled responses and to provide a mean score for each respondent if at least one response was given. This type of calculation minimizes missing data bias by including more respondents in the analysis and creating a score that is not reflective of the actual number of questions answered but the answers themselves.

For analytical purposes, the Mexican American population was further dichotomized by location of residence. Those Mexican Americans who live in ZIP codes 85706, 85713, and 85714 were identified as "southside Mexican Americans," while all other Mexican Americans were identified as "non-southside Mexican Americans." Southside Mexican Americans constituted 41.39% of the total Mexican American population surveyed. The rationale for this geographic comparison between non-southside and southside Mexican Americans is that southside residents live closer to the preponderance of environmental hazards than do their mostly westside counterparts. Characteristics of respondents indicated that non-southside Mexican Americans are better educated, have higher incomes, and live near fewer environmental hazards than their southside counterparts.

We used two sets of comparisons. T tests were used to compare the mean scores of Caucasians and all Mexican Americans. To ascertain whether there was any residency effect among the Mexican American population, the general linear model procedure was used to compare the means of Caucasians, southside Mexican Americans, and non-southside Mexican Americans.

Results

Response Characteristics

Interviewers called respondents over a 1-month period. A total of 1,183 Tucson residents completed the entire survey. The actual refusal rate was 20.5%. The literature suggests that refusal rates increasingly pose a source of bias for telephone surveys (63–65). The rate of respondent refusal to participate in this study is comparable to that of other large population surveys (65–67). In this study, interviewers were not allowed to call back an unwilling respondent. In accordance with the University of Arizona Institutional Review Board directives, researchers must adhere to a respondent's wishes to end his or her participation at any time during the study.

Sample Characteristics

Using 1990 U.S. Census data for comparison, the demographic characteristics of the sample were similar to demographic characteristics of the study region. In terms of race, 2.6% of this sample self-identified as African Americans compared with approximately 3.8% of the study region. The actual percentage of Caucasians in the study region was estimated at 63.7% for all Caucasians regardless of ethnicity, while 66% of the sample self-identified as such. Native Americans constitute approximately 3.5% of the population in the study region and make up slightly more than 1% of the sample. With respect to ethnicity, 28.7% of the population in the study region are Mexican American, while 23.1% of the sample self-identified as Mexican American.

The sample and study region differed slightly with respect to age distribution. In the study region, 25% of residents were between 25 and 39 years of age compared with 28.3% in the sample. In the study region, 24% of residents were between the ages of 40 and 64 and 8% were between the ages of 65 and 74 (31). Of those sampled, 40.3% were between the ages of 40 and 64 and 10.9% were between the ages of 65 and 74. Both the sample and study region consist of a relatively small percentage of people over 74 years of age. In the study region 5% of residents were over the age of 74 compared with 6.8% of those in the sample (62).

In terms of income, the study region and the sample residents have similar profiles. The average median annual income for the study region is \$30,000. In the sample, 13.3% reported an income between \$25,000 and \$35,000 per year, and 16.1% reported an income between \$35,000 and \$50,000 per year. The sample and study regions differed somewhat with respect to gender. In the study region, 48% of the respondents are male. In the sample, 40.4% of respondents identified as male. Although males are typically underrepresented in population surveys, the male representation in this sample is comparable to those in other large population surveys (Table 1).

Socioeconomic stress. Primary data obtained from this study indicate that southside Mexican Americans appear to be much more vulnerable to socioeconomic stressors than Caucasians in Tucson. Southside Mexican American respondents reported lower educational attainment, lower incomes, and more years as residents of Tucson. These numbers were all statistically significantly different from those reported by non-southside Mexican Americans and Caucasians at the $p < 0.01$ level. Thirty-three percent of the southside Mexican American respondents

reported no educational attainment above a general equivalency diploma (GED) or high school. Responses in this same category were 12.5% for non-southside Mexican Americans and 1.6% for Caucasians. Median income for southside Mexican Americans was between \$15,000 and \$20,000 per year, between \$25,000 and \$35,000 for non-southside Mexican Americans, and between \$35,000 and \$50,000 for Caucasians. The mean years of residence in Tucson was 24.5 for southside Mexican Americans, 19.3 for non-southside Mexican Americans, and 18.9 for Caucasians.

Perceived environmental and social inequity. Overall, Tucson residents had moderate to high perceptions of inequity

and need ($n = 1,182$; mean = 3.57), and this level remained consistently high when mean scores were examined by ethnicity. Table 2 depicts residents in each of the areas of perceived need and inequity.

As shown in Table 2, Caucasian and Mexican American respondents differ significantly in their responses in three major areas. Mexican American respondents were 1.69 times more likely than Caucasian respondents to agree with the statement “Some Tucson residents have become ill from drinking tap water.” Mexican American respondents were 1.22 times more likely than Caucasian respondents to agree with the statement “People on the southside

have a greater risk of receiving contaminated water than do people living in other areas.” Mexican American respondents were 1.64 times more likely than Caucasian respondents to agree with the statement “Tucson frequently discriminates against ethnic minority groups in Tucson.”

When we compared overall scores on the 9-item scale, statistically significant differences were found between Mexican Americans and Caucasians. Mexican American respondents perceived greater inequity and need than the Caucasians ($p < 0.0001$). When Mexican Americans were further stratified by location of residence, statistically significant differences were also found ($p < 0.0001$). Southside Mexican Americans experienced the greatest amount of perceived inequity/need (3.97), followed by non-southside Mexican Americans (3.76) and Caucasians (3.49).

Perceived risk of water quality-related activities. Tucson residents, overall, did not have high-risk perceptions about water quality and consumption (2.97). Table 3 illustrates the differences in perceptions between the two groups in each area.

Table 3 shows three major areas of disagreement between Caucasian and Mexican American respondents. Mexican American respondents were 3 times more likely than Caucasian respondents to associate high risk with “drinking filtered tap water from underground wells.” Mexican American respondents were 2.16 times more likely than Caucasian respondents to associate high risk with “drinking tap water from underground wells.” Mexican American respondents were 2.05 times more likely than Caucasian respondents to associate high risk with “drinking filtered tap water that is blended with CAP water.”

When we compared overall scores on the 9-item scale, statistically significant differences were found when this construct was examined by ethnicity. Caucasians had lower perceptions of risk (2.92) than all Mexican Americans (3.10; $p < 0.02$). Interestingly, when Mexican Americans were further stratified by resident location, significant differences were found ($p < 0.04$) (Table 4). However, the differences were between southside Mexican Americans (3.17) and Caucasians. Non-southside Mexican Americans did not differ significantly from either Caucasians or southside Mexican Americans.

Perceived efficacy of risk reduction. Tucson residents overall had moderate perceptions (3.51) of the benefit of activities designed to improve water quality. Overall, Mexican and Caucasian respondents demonstrated significant differences in perceived efficacy of risk reduction activities. However,

Table 1. Personal characteristics of Caucasian and Mexican American respondents by region.

Personal characteristics of respondents	Race and region			Total
	Southside Mexican American (%)	Non-southside Mexican American (%)	Caucasian (%)	
Gender				
Male	27.4	36.3	41.3	39.1
Female	72.6	63.8	58.7	60.9
Degree obtained				
No degree	34.8	15.1	1.7	7.2
GED	0.9	1.3	1.3	1.2
High school	43.8	50.9	38.3	40.8
Technical school	5.4	10.7	3.7	4.9
College (associate, bachelor's)	13.4	17.6	39.5	33.4
Graduate school (master's, PhD, MD)	1.8	4.4	15.5	12.4
Annual income				
<5 K	9.8	3.6	1.9	3.0
5 K to <10 K	13.0	9.4	4.6	6.2
10 K to <20 K	30.4	26.1	12.6	16.5
20 K to <35 K	27.2	21.0	24.1	24.0
35 K to <75 K	18.5	33.3	39.0	36.0
>75 K	1.1	6.5	17.8	14.4
Mean number of years lived in Tucson	23.9	19.2	18.9	19.5
Mean age	39.7	37.6	47.5	45.2

K, thousands of dollars.

Table 2. Perceived inequity and need among Caucasians and Mexican Americans.

		Caucasian (%)	Mexican American (%)	Total (%)
Some Tucson residents have become ill from drinking Tucson tap water	Disagree	24.7	8.3	20.6
	Neutral	37.8	28.1	35.4
	Agree	37.5	63.6	44.1
People on the southside have a greater risk of receiving contaminated water than other Tucson areas	Disagree	20.0	12.5	18.0
	Neutral	23.5	18.5	22.2
	Agree	56.5	69.0	59.8
The health effects of drinking water should be studied prior to any changes in our water source	Disagree	6.0	4.5	5.6
	Neutral	3.8	4.1	3.9
	Agree	90.3	91.4	90.6
There are a greater number of environmental hazards located in south Tucson than in other areas of Tucson	Disagree	16.5	15.2	16.2
	Neutral	19.5	18.0	19.1
	Agree	63.9	66.8	64.7
Water contamination is no longer a problem in south Tucson	Disagree	69.3	73.6	70.5
	Neutral	19.7	15.3	18.5
	Agree	11.0	11.1	11.1
More studies are needed to examine environmental illnesses among south Tucson residents	Disagree	11.3	3.1	9.1
	Neutral	11.6	5.1	9.8
	Agree	77.0	91.8	81.1
Tucson city government frequently discriminates against ethnic minority groups in Tucson	Disagree	56.9	32.9	50.8
	Neutral	22.4	24.5	22.9
	Agree	20.8	42.6	26.3
Ethnic minority groups in Tucson have equal access to environmental protection	Disagree	20.4	25.2	21.7
	Neutral	13.3	11.8	12.9
	Agree	66.3	63.0	65.4

this was no longer the case when respondents were examined by ethnicity ($p < 0.43$). When Mexican American respondents were further stratified by residence location, more distinct differences were found, with southside Mexican Americans perceiving the least benefit (3.33). These differences, however, were not significant at the 0.05 level ($p < 0.07$) (Table 4).

Perceived institutional trust. Overall trust was moderate (3.46), and no significant differences were found between Caucasians and Mexican Americans ($p < 0.12$). Overall, the most frequently reported types of activity were voting and volunteering in a church or civic function. The least frequently reported type of activity was participation in labor union activities or a public protest.

Table 5 shows two areas of disagreement between Caucasian and Mexican American respondents. Mexican American respondents were 1.29 and 1.24 times more likely than Caucasians to trust the media and the city manager, respectively. Overall, the two most trusted institutions were University of Arizona scientists and the Arizona Department of Health; the three least trusted institutions were Tucson City Council members, Tucson Water, and the media.

Respondents also differed geographically. Non-southside Mexican Americans were the most trustful of all the respondents. Although Tucson residents overall were somewhat trustful (3.52), Mexican Americans (3.65) were, on average, statistically more trustful than Caucasians ($p < 0.002$). Non-southside Mexican Americans demonstrated significantly more trust (3.71) than both southside Mexican Americans (3.57) and Caucasians (3.50) ($p \leq 0.001$).

Level of public participation. We found large differences when we examined the amount of public participation. Caucasians, on average, participated in more than three (3.19) public activities, whereas Mexican Americans, on average, participated in fewer than two (1.82). This difference was statistically significant ($p < 0.0001$). Table 6 provides a summary of the reported level of participation of the two groups over the past year.

As shown in Table 6, there is considerable disparity among Mexican American and Caucasian respondents with respect to public participation. Mexican American respondents reported significantly less participation 8 of the 10 categories of participation. Five of the categories had large differences in participations. Mexican American respondents were 80% less likely than Caucasians to contact an elected official; 74% less likely to vote; 72% less likely to write a letter to the editor; 68% less likely to sign a petition; and 62% less likely to attend a public meeting.

When Mexican Americans were further stratified by residence location, we found that non-southside Mexican Americans participated in more activities (1.95 vs. 1.64), but the difference between the two Mexican American groups was not significant. Overall, southside Mexican Americans

reported being less active in public activities than other Tucson residents. Southside Mexican American residents (33.3%) were less likely than non-southside Mexican Americans (37.8%) and Caucasians (57.8%) to have voted on a recent water referendum, but when southside Mexican Americans did

Table 3. Perceived risk by activity among Caucasians and Mexican Americans.

		Caucasian (%)	Mexican American (%)	Total (%)
Drinking tap water from underground wells	No to small chance	63.9	48.4	59.9
	Fair chance	21.4	19.8	21.0
	Good to certain chance	14.7	31.7	19.1
Drinking filtered tap water from underground wells	No to small chance	79.2	68.5	76.4
	Fair chance	14.8	13.4	14.4
	Good to certain chance	6.0	18.1	9.1
Drinking tap water that is blended with CAP water	No to small chance	54.1	43.5	51.6
	Fair chance	24.1	26.9	24.7
	Good to certain chance	21.8	29.6	23.6
Drinking filtered tap water that is blended with filtered CAP water	No to small chance	69.8	62.3	67.9
	Fair chance	18.6	14.0	17.5
	Good to certain chance	11.6	23.7	14.5
Drinking CAP water	No to small chance	40.1	34.0	38.7
	Fair chance	22.3	18.9	21.5
	Good to certain chance	37.5	47.2	39.8
Drinking filtered CAP water	No to small chance	57.0	55.0	56.5
	Fair chance	22.6	15.3	20.9
	Good to certain chance	20.3	29.7	22.6
Drinking water from underground wells located within or near industrial areas	No to small chance	13.2	11.9	12.9
	Fair chance	25.9	24.6	25.6
	Good to certain chance	60.8	63.5	61.5
Drinking water that contains contaminants below regulatory limits	No to small chance	34.1	32.8	33.8
	Fair chance	26.1	15.2	23.4
	Good to certain chance	39.7	52.0	42.8
Drinking water that contains contaminants above regulatory limits	No to small chance	11.3	8.6	10.7
	Fair chance	17.4	13.3	16.4
	Good to certain chance	71.2	78.1	73.0

Table 4. Mean levels of criterion variables among Caucasian versus Mexican American respondents before and after controlling for income, education, and length of time living in Tucson.

Variable	Without control			With control		
	Caucasian	Mexican American	Mean differences	Caucasian	Mexican American	Mean differences
Participation in public activities	3.19	1.82	1.37*	3.05	2.48	0.57*
Perceived efficacy of risk reduction	3.54	3.49	0.05	3.58	3.48	0.1
Perceived inequity	3.49	3.85	-0.36*	3.48	3.85	-0.37*
Trust in groups	3.5	3.65	-0.15*	3.51	3.65	-0.14*
Perceived risk	2.92	3.1	-0.18*	2.93	3.08	-0.15

*Statistically significant.

Table 5. Perceived institutional trust among Caucasians and Mexican Americans.

Institutions	Caucasian		Mexican American		Total	
	Mean	SD	Mean	SD	Mean	SD
University of Arizona scientists	4.3	0.8	4.2	0.8	4.2	0.8
Arizona Department of Health	3.8	1.0	4.0	1.0	3.9	1.0
Local civic organizations	3.7	0.9	3.8	1.0	3.7	1.0
U.S. Environmental Protection Agency	3.6	1.1	3.8	1.1	3.7	1.1
Arizona Department of Environmental Quality	3.5	1.1	3.8	1.0	3.6	1.1
Mayor	3.5	1.0	3.6	1.1	3.5	1.1
Local environmental justice groups	3.5	1.1	3.8	1.0	3.6	1.0
Tucson Water (local water utility)	3.3	1.2	3.3	1.1	3.3	1.2
City manager	3.3	1.0	3.5	1.0	3.3	1.0
Media (newspapers, television, radio)	3.0	1.2	3.5	1.2	3.2	1.2
Tucson City Council members	2.9	1.1	3.1	1.2	2.9	1.1

SD, standard deviation.

*Low scores range from 1 (low trust) to 5 (high trust). Derived from 5-point Likert-type scale (strongly distrust = 1; distrust = 2; neutral = 3; trust = 4; strongly trust = 5).

Table 6. Participation in public activities among Caucasians and Mexican Americans.^a

Activities in which respondent participated	Caucasian (%)	Mexican American (%)	Total (%)
Voted in a public election	23.1	22.9	23.1
Volunteered for a civic or church function	17.3	19.7	17.7
Signed a petition	16.7	14.7	16.4
Attended a public meeting	10.9	9.3	10.6
Called the police for any reason	10.3	14.5	11.0
Contacted an elected official	10.1	4.8	9.2
Organized a neighborhood function	4.5	6.0	4.7
Wrote a letter to the newspaper editor	2.7	1.4	2.5
Participated in a public protest	2.5	2.4	2.5
Participated in labor union activities	1.8	4.2	2.2

^aDerived from Yes or No responses.

vote, they were more likely than the other groups to have been influenced by the media (51.6%; non-southside Mexican Americans, 33.3%; Caucasians, 39.9%).

Overall comparisons of perceptions of risk, inequity, efficacy of risk reduction, institutional trust, and public participation. We analyzed mean levels of each criterion variable using both a one-way analysis of variance (ANOVA) and a two-way analysis of covariance (ANCOVA). Using the ANOVA model, we analyzed significant differences between the two ethnic groups in mean levels of each criterion variable without accounting for variation in income, education, and length of time spent living in Tucson. With the ANCOVA model we controlled for these three variables. Table 4 shows the observed means and differences in means.

In the ANOVA model, Caucasians participated in significantly more public activities than Mexican Americans in the sample ($F = 101.85$; $p \leq 0.05$). Caucasians also were significantly less trusting in groups ($F = 10.17$; $p \leq 0.05$) and perceived significantly less environmental risk ($F = 5.74$; $p \leq 0.05$) than Mexican Americans in the sample. Mexican Americans perceived a significantly higher degree of inequity and racism toward Mexican Americans in Tucson than Caucasians in the sample ($F = 45.69$; $p \leq 0.05$). Finally, there was no significant difference between the two ethnic groups with respect to perceived efficacy of risk reduction ($F = 0.61$; $p \geq 0.05$).

We used five separate two-way ANCOVA models to analyze the same five criterion variables while controlling for respondents' annual income, education level, and number of years respondents lived in Tucson. The ANCOVA models allowed us to evaluate the extent to which significant differences between the groups were either a function of ethnicity or a function of socioeconomic variation. The ANCOVA models indicated that for the most part significant ethnic variation was still evident between the groups even when we controlled for a respondent's socioeconomic status. Perceived risk provided the only exception. Unlike the

original ANOVA model, the ANCOVA model yielded significant difference between Caucasians and Mexican Americans with respect to risk perception when accounting for variation in respondent income, education, and time in Tucson.

The remaining three ANCOVA models still yielded significant ethnic differences while controlling for the three socioeconomic variables. First, Caucasians still participated in significantly more public activities than Mexican Americans in the sample ($F = 58.58$; $p \geq 0.05$; $R^2 = 0.21$). This model is fairly predictive of public participation, explaining about 21% of the variance in participation between these two groups. However, the mean difference in participation decreased from 1.37 to 0.57 when taking socioeconomic variation into account. Second, Caucasians remained significantly less trusting in groups than Mexican Americans ($F = 2.91$; $p \geq 0.05$; $R^2 = 0.013$). Finally, Mexican Americans perceived significantly more inequity and racism toward their ethnic group than Caucasians ($F = 12.03$; $p \geq 0.05$; $R^2 = 0.051$). The predictive capacity of the latter two models is notably lower than that of the first. The second model explains only about 1% of the variance in trust, and the third model explains only about 5% of the variance in perceived inequity. Consequently, trust and perceived inequity cannot be adequately explained by ethnicity alone.

Discussion

The purpose of this investigation was to determine the extent to which Caucasians and Mexican Americans living in the Tucson metropolitan area differ in their perceptions of environmental risk, inequity, trust, and participation in civic activities. Specifically, we sought to determine the extent to which ethnicity, income, education, and length of residence influence public perception and participation. We found that ethnicity strongly influences participation in civic activities irrespective of income, education, and length of residence in Tucson. Further, ethnicity also explains a significant amount

of the variation in one's perceptions toward environmental inequity and trust in specific groups irrespective of income, education, and length of residence in Tucson. However, perceptions of water quality–related risks were affected by socioeconomic disparities between Caucasians and Mexican Americans, thus rendering ethnicity as an inadequate predictor of such perceptions.

Mexican Americans in our study demonstrated significantly higher perceptions of water quality–related risks only when the socioeconomic variables of income, education, and length of residence were not considered. When we controlled for these variables, perceptual differences between the two groups were no longer significant.

Many of these findings are consistent with the extant literature. Heightened perceptions and inequity are often prevalent among disadvantaged minority populations (3,60). In fact, the mere presence of environmental hazards in a community has profound adverse effects upon the perceptions of community members (3). Despite the obvious need to change public policy in environmentally stressed minority communities, as shown in this study, participation in civic activities is typically low (3,60,61,68). Mexican Americans in this study appear to be no exception. Their annual participation levels were well below (1.82–2.5) those of other residents living near hazardous waste sites (60). In contrast, participation by Caucasian respondents was actually higher (3.19–2.5) than that demonstrated by respondents in other studies (60). The specific and variable determinants of public participation among Mexican American populations should be investigated more thoroughly. This study begs the question “Why does environmental inequity not provide sufficient impetus for civic participation among ethnic minority groups?” Additionally, the precise conditions (e.g., education, competent political representation) needed to empower such populations to advocate their needs should also be explored. Clearly, minority populations often do not have equitable access to assorted venues of public participation, thus limiting their ability to affect policy (61).

Mexican Americans in this study reported surprisingly high levels of institutional trust despite the inequitable conditions of their communities. Mexican American respondents were even more trusting of environmentally related institutions than Caucasians who live in arguably more environmentally friendly communities. A high level of institutional trust among economically disadvantaged groups is uncommon. Given the documented and perceived environmental inequities among Mexican

American residents in Tucson, it is puzzling why these residents would be so trusting of environmentally related institutions.

It is reasonable to suggest that institutional trust among Mexican Americans may largely be a function of acculturation. Acculturation has significant effects on beliefs and practices of Mexican Americans (69–71). Future investigations should examine specific cultural values and acculturation levels among the Mexican American population in Tucson in relation to environmental perceptions. Certain cultural values and factors such as *confianza* (trust), and *respeto* (respect) may explain to an extent the reverence of Tucson's Mexican Americans toward elected officials and authority. By demonstrating *respeto* and having *confianza* in local authorities, there is an inherent belief that they will be treated in the same manner. This is especially true for low-income, low-educated, and low-acculturated Mexican American populations (69).

Another cultural factor that warrants further consideration is the level of conformity in the Mexican American population. The feeling of powerlessness against the dominant culture lends itself to the notion that the dominant culture is better and should therefore not be doubted (69,70). Additionally, Mexican Americans frequently feel compelled to provide the socially desirable response. For instance, the cultural value *simpatia* "mandates politeness and respect and discourages criticism, confrontation, and assertiveness" (70). Hence, this may further explain why Mexican Americans in Tucson are less likely to report distrust in local authorities. The relationship between acculturation and environmental perceptions and participation remains unclear and should be investigated further.

Despite the observed differences between Caucasians and Mexican Americans in this study, there are some striking similarities. The vast majority of these respondents agree on several issues. For example, almost 65% of respondents indicated they believe there are a greater number of environmental hazards located in southern Tucson than in other areas of Tucson. Approximately 71% of respondents indicated they believe water contamination is still a problem in southern Tucson. Approximately 91% of respondents indicated they believe the health effects of drinking water should be studied before any changes are made in our water source. In brief, most Tucsonans perceive environmental conditions for southside residents to be disparate. For the most part, these respondents also appear to distrust the same institutions. The Tucson City Council is the most distrusted group among both Caucasians and Mexican Americans. Both groups also

exhibited mutual distrust of the media and Tucson Water. Although the overall level of trust is higher among Mexican Americans than Caucasians, they both agree on the institutions that they believe do not deserve public trust.

In many instances environmental issues draw a decisive line between the "haves" and the "have-nots." In this case the majority of Tucsonans seem to empathize with the environmental plight of the less fortunate. In light of the observed agreement between the two groups, it is plausible that environmental policy changes on the southside need not originate solely from southside residents. Perhaps the more-educated and affluent Caucasian Tucsonans and non-southside Mexican Americans are in a position to act as third-party advocates for Mexican American Tucsonians. Future investigations should examine the extent to which Caucasian Tucsonans would be willing to advocate such a cause and the extent to which Mexican American Tucsonians would be receptive to such advocacy. Given the proclivity of Caucasian Tucsonans to be publicly active (e.g., voting), the effect of their advocacy might be seen within a short time. Middle-class non-southside Mexican Americans may also be in a better position than their southside counterparts to participate in environmental policy decisions.

Improving the environmental health of Mexican American populations is a pressing public health concern. To achieve environmental equity among Mexican Americans, public health officials must first understand the perceptions and values of the Mexican American community. Studies such as this provide some insight into the diverse environmental perceptions of Mexican Americans. Additionally, public health officials must realize that many successful environmental health interventions materialize from within the Mexican American population rather than from some external group. Evidence indicates that minority communities are becoming increasingly effective in changing environmental policy (7). Others have found that Mexican Americans can effectively "translate their numbers into an effective political presence" (72). Understanding how Mexican American communities effectively ameliorate environmental inequity represents a critical public health priority.

References and Notes

- Cooper MH. Environmental justice: plight of the poor. *The CQ Res* 8(23):529–552 (1998).
- U.S.EPA. Respiratory Health Effects of Passive Smoking EPA/600/6-90/006F. Washington, DC:U.S. Environmental Protection Agency, 1992.
- Greenberg M, Schneider D. Environmentally Devastated Neighborhoods: Perceptions, Realities, and Policies. New Brunswick, NJ:Rutgers University Press, 1996.
- Mohai P, Bryant B. Environmental racism: reviewing the evidence. In: *Race and the Incidence of Environmental Hazards* (Bunyan B, Mohai P, eds). Boulder, CO:Westview Press, 1992;163–176.
- United Church of Christ (UCC), Commission for Racial Justice. Toxic waste and race in the United States: a national report on the racial and socioeconomic characteristics of communities with hazardous waste sites. New York:United Church of Christ, 1987.
- National Asthma Education Program. Guidelines for the Diagnosis and Management of Asthma. Bethesda, MD:National Heart, Lung, and Blood Institute, 1991.
- National Asthma Education Program. Task Force Report on the Cost Effectiveness, Quality of Care, and Financing of Asthma Care. *Am Rev Respir Dis* 154 (2, pt 2):S81–S130 (1996).
- DHHS. Health, United States, 1998, Socioeconomic and Health Chartbook. Washington, DC:U.S. Department of Health and Human Services, 1998.
- Calderon RL, Johnson CC Jr, Craun GF, Dufour AP, Karlin RJ, Sinks T, Valentine JL. Health risks from contaminated water: do class and race matter? *Toxicol Ind Health* 9(5):879–900 (1993).
- Howe SL, Delfino RJ, Taylor TH, Anton-Culver H. The risk of invasive cervical cancer among Hispanics: evidence for targeted preventive interventions. *Prev Med* 27(5):674–680 (1998).
- Montgomery LE, Carter-Pokas O. Health status by social class and/or minority status: implications for environmental equity research. *Toxicol Ind Health* 9(5):729–773 (1993).
- Rios R, Poje GV, Detels R. Susceptibility to environmental pollutants among minorities. *Toxicol Ind Health* 9(5):797–820 (1993).
- Bowen WM, Salling MJ, Haynes KE, Cryan EJ. Toward environmental justice: spatial equity in Ohio and Cleveland. *Ann Assoc Am Geogr* 85(4):641–663 (1995).
- Tarlock AD. City versus countryside: environmental equity in context. *Fordham Urban Law J* 21:461–494 (1994).
- Heitgerd JL, Burg JR, Strickland HG. A geographical information systems approach to estimating and assessing national priorities list site demographics: racial and Hispanic origin composition. *Int J Occup Med Toxicol* 4(3):343–363 (1995).
- National Research Council. National Academy of Sciences. Indoor Pollutants. Washington, DC:National Academy Press, 1991.
- Whorton MD, Morgan RW, Wong O, Larson S, Gordon N. Problems associated with collecting drinking water quality data for community studies: a case example, Fresno County, California. *Am J Public Health* 78(1):47–51 (1998).
- Wong O, Whorton MD, Gordon N, Morgan RW. An epidemiologic investigation of the relationship between DBCP contamination in drinking water birth rates in Fresno County, California. *Am J Public Health* 78(1):43–46 (1988).
- Anderton DL, Anderson AB, Oakes JM, Fraser MR. Environmental equity: the demographics of dumping. *Demography* 31(2):229–224 (1994).
- Collins J, Schulte N, Drolet A. Differential effect of ecologic risk factors on the low birthweight components of African-American, Mexican-American, and non-Latino white infants in Chicago. *J Natl Med Assoc* 90:223–229 (1998).
- Collins J, Shay D. Prevalence of low birth weight among Hispanic infants with United States-born and foreign-born mothers: the effect of urban poverty. *Am J Epidemiol* 139:184–192 (1996).
- English P, Kharrazi M, Guendelman S. Pregnancy outcomes and risk factors in Hispanics: the effect of language use and mother's birthplace. *Ethn Dis* 7:229–240 (1997).
- Guendelman S, English P. Effect of United States residence on birth outcomes among Mexican immigrants: an exploratory study. *Am J Epidemiol* 142(suppl):30–38 (1995).
- Levine JS, Markides K. Religion and health in Hispanics. *J Rel Health* 24(1):60–69 (1995).
- Marin G, Gamba RA. New measurement of acculturation for Hispanics: the bidimensional acculturation scale for Hispanics (BAS). *Hisp J Behav Sci* 18:297–316 (1996).
- Mirowsky J, Ross CE. Minority status, ethnic culture, and

- distress: a comparison of Blacks, Whites, Mexicans, and Hispanics. *Am J Sociol* 86(3):479–495 (1980).
27. Scribner R, Dwyer J. Acculturation and low birthweight among Latinos in the Hispanic HANES. *Am J Public Health* 76:1263–1267 (1989).
 28. U.S. Bureau of the Census. Census of Population and Housing for the State of Arizona. Washington, DC:U.S. Bureau of the Census, 1990.
 29. Williams B, Pennock-Roman M, Suen H. Assessing the Differential Impact of Social and Environmental Exposures on the Health Status of Hispanic Populations: A Case for Hierarchical Linear Modeling. *Socioecon Plan Sci* (in press).
 30. O'Rourke MK, Lebowitz MD. Indoor bioaerosol contaminants. In: *Environmental Toxicants: Human Exposures and Their Health Effects*, 2nd ed (Lippmann M, ed). New York:van Nostrand Reinhold, 1999:449–480.
 31. Rogan SP, O'Rourke MK, Robertson G, Lebowitz MD. Unpublished report, 2000.
 32. Rogan SP. Unpublished technical report, 2000.
 33. Arizona Department of Health Services. Update of the incidence of childhood cancers and testicular cancer in Southwest Tucson: 1987–1991. Phoenix, AZ:Arizona Department of Health Services, 1995.
 34. Arizona Department of Health Services. Disease Prevention Services Office of Risk Assessment and Investigation. Report on Mortality in Southwest Tucson 1984–1991. Phoenix, AZ:Arizona Department of Health Services, 1994.
 35. Arizona Department of Health Services. The Incidence of Childhood Leukemia and Testicular Cancer in Pima County: 1970–1986. Phoenix, AZ:Arizona Department of Health Services, 1990.
 36. ATSDR. Trichloroethylene (TCE) Subregistry Registrant Report Baseline through Follow-up, 3 Atlanta, GA:U. S. Agency for Toxic Substances and Disease Registry, 1999.
 37. Goldberg SJ, Lebowitz MD, Graver EJ, Hicks S. An association of human congenital cardiac malformations and drinking water contaminants. *J Am Coll Cardiol* 16:155–164 (1990).
 38. Kilburn KH, Warshaw RH. Prevalence of symptoms of systemic lupus erythematosus (SLE) and of fluorescent antinuclear antibodies associated with chronic exposure to trichloroethylene and other chemicals in well water. *Environ Res* 57(1):1–9 (1992).
 39. Clarke JN, Gerlak AK. Environmental racism in the Sunbelt? A cross-cultural analysis. *Environ Manage* 22(6):857–867 (1998).
 40. Institute of Medicine. *Toward Environmental Justice: Research, Education, and Health Policy Needs*. Washington, DC:National Academy Press, 1999.
 41. Arizona Department of Environmental Quality (ADEQ) Waste Programs Division: Superfund Programs: Site Info: Tucson Area Sites. Available: <http://www.adeq.state.az.us/environ/waste/sps/tucsites.html> [accessed 5 January 2001].
 42. Health Resources and Services Administration. Evaluation of HRSA Sanitarian Assignment in Nogales, Arizona. In: *Environmental Toxicants: Human Exposures and Their Health Effects*, 2nd ed (M. Lippmann (ed). New York:van Nostrand Reinhold. Available: <http://www.bphc.hrsa.dhhs.gov/borderhealth/> [accessed 15 November 2000].
 43. Varady RG, Mack MD. Transboundary water resources and public health in the U.S.-Mexico border region. *J Environ Health* 57(8):8–14 (1995).
 44. Bureau of Reclamation, Phoenix, AZ. Central Arizona Project. Information Packet No. 3, 1979.
 45. Wilson LG, Matlock WG, Jacobs KL. Hydrogeologic uncertainties and policy implications: The Water Consumer Protection Act of Tucson. *Hydrogeol J* 6(1):3–14 (1998).
 46. Price S, Jefferson FT. Corrosion control strategies for changing water supplies in Tucson, Arizona. *J N Engl Water Works Assoc* 111(3):285–293 (1997).
 47. Miller S, Rein M, Levitt P. Community action in the United States. *Commun Dev J* 25:356–368 (1990).
 48. Slovic P. Perceptions of environmental hazards: psychological perspectives. In: *Behavior and Environment: Psychological and Geographical Approaches* (Garling T, Golledge RG, eds). New York:Elsevier, 1993:223–248.
 49. Thompson M, Ellis R, Wildavsky A. *Cultural Theory*. Boulder, CO:Westview, 1990.
 50. Greenberg M, Williams B. Geographical dimensions and correlates of trust. *Risk Anal* 19(2):159–169 (1999).
 51. Williams BL, Brown S, Greenberg M. Determinants of trust perceptions among residents surrounding the Savannah River Nuclear Weapons Site. *Environ Behav* 31:354–371 (1999).
 52. Cohen N. Technical assistance for citizen participation: a case study of New York City's environmental planning process. *Am Rev Public Admin* 25(2):119–135 (1995).
 53. Davis C. Public involvement in hazardous waste siting decisions. *Polity* 19(2):296–304 (1986).
 54. Petts J. The public-expert interface in local management decisions: expertise, credibility and process. *Public Understand Sci* 6:359–381 (1997).
 55. Kaplan S, Kaplan R. The visual environment: public participation in design and planning. *J Social Issues* 45(1):59–86 (1989).
 56. Lidskog R. From conflict to communication? Public participation and critical communication as a solution to siting conflicts in planning for hazardous waste. *Plan Pract Res* 12(3):239–249 (1997).
 57. Glick J. Effective public involvement in public decisions. *Sci Commun* 20(3):298–327 (1999).
 58. Feldman DL, Hanahan RA. Public perceptions of a radioactively contaminated site: concerns, remediation preferences, and desired involvement. *Environ Health Perspect* 104:1344–1352 (1996).
 59. Reagan MD, Fedor-Thurman VL. Public participation: Reflections on the California energy policy experience. *Citizen Participation in Public Decision Making*. Westport, CT:Greenwood Press, 1987.
 60. Williams B, Suen H, Brown S, Bruhn R, de Blaquiere R, Rza S. A Hierarchical linear model of factors associated with public participation among residents living near the U.S. Army's chemical weapons stockpile sites. *Environ Plan Manage* 44(1):41–65 (2001).
 61. Taylor DE. Minority environmental activism in Britain: from Brixton to the Lake District. *Qual Sociol* 16(3):263–295 (1993).
 62. Arizona Department of Economic Security Division of Employee Services and Support. Population Statistics. Available: <http://www.de.state.az.us/links/economic/webpage/index.html> [accessed 21 November 1999].
 63. Hox JJ, de Leeuw ED. A comparison of nonresponse in mail, telephone, and face-to-face surveys. *Qual Quant* 28:329–344 (1994).
 64. Schmidley AD. How to overcome bias in telephone survey. *Am Demograph* 8:50–55 (1988).
 65. Smith TW. Trends in non-response rates. *International J Public Opin Res* 7(2):157–171 (1995).
 66. Luevano P. Response Rates in the National Election Studies. Tech Rep no. 44. Ann Arbor, MI:National Elections Studies, 1994.
 67. Davis JA, Smith TW. *The NORC General Social Survey: A User's Guide*. Newsbury Park:Sage, 1992.
 68. Brown S, Williams B. Determinates of Public Involvement Among Residents Living Near the Savannah River Site. Presented at the annual meeting of the Society for Risk Analysis, November 1998, Phoenix, AZ. Available: <http://www.riskworld.com/Abstract/AB5ME001.HTM> [accessed 1998].
 69. Molina CW, Aguirre-Molina M. Latino Health in the US: a Growing Challenge. Washington, DC:American Public Health Association, 1994.
 70. Marin G, Marin BV. *Research with Hispanic Populations*. Applied Social Research Methods Series, 23. Sage Publications, 1991.
 71. Lecca PJ, Quervalu I, Nunes JV, Gonzales HF. *Cultural competency in Health, Social, & Human Services*. New York:Garland Publishing, 1998.
 72. Morrison PA. Demographic influences on Latinos' political empowerment: comparative local illustrations. *Popul Res Policy Rev* 17(3):223–246 (1998).